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Philosophical Transactions

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concerned in the publication hereof in your Monethly Book; I pray, direct such as shall desire to make any use hereof or be further satisfied herein, to Mr. *Thomas Rastell* at the Jerkers Office in the Custome house, or to the said Mr. *Rastell* or Mr. *Francis Dracott* at Mr. *Garrawayes* Coffee-house, where they will be found every *Tuesday* and *Thursday* from eleven to twelve of the clock, and afterwards the same dayes in the *West-India-Walk* upon the Exchange. The said Mr. *Rastell* and Mr. *Dracott* being the persons imployed by the Parties concerned in the management of this Work, they may receive satisfaction from them, that this way of sheathing is as cheap as the other, much more durable, and in many respects more beneficial to the Owners, both in point of charge and advantage in sayling, then any way of sheathing hitherto used. This is all at present from, *Sir*

Westminst. this 7th.
of Feb. 1673
74

Tour very humble Servant
John Bulseel.

An Account of two Books:

I. *MUSICA SPECULATIVA* del Mengoli, Dottor dell' una & l'altra Legge, & P.P. de scienze *Mechaniche* nello Studio di Bologna: In Bologna 1670. in 4°.

OF this *Italian* Treatise we could give no sooner notice, because it came but very lately to our hands, though it hath been printed three years ago. The famous Author undertakes to give in it a better account of Musick and the reasons of Songs, than has been done hitherto. And whereas among the suppositions of Musick it hath been received for an undoubted Axiom, that *Consonance* is made by the frequent union of two Sounds in striking the *External Drum* of the Ear, (for he pretends there is another Drum) at one and the same time: he affirms to have discover'd this to be utterly false, and maketh it his business to prove it in the 4th and 17th speculation of this Book. In the making of which Discovery he relates to have been assisted by taking an exact view of the *Organ of Hearing* it self; he and his Anatomical friends having there taken particular notice, How the three little bones are fastned to one another and to the *two Drums*, the *External* and *Internal*, (Anatomists having hitherto spoken but of *one* only.)

ly,) and to the little Cavern and the mouth thereof; and how they were able to guide the threds through the passage of that cavern. And having carefully observed all these parts, both as they were Joyned together in their respective places, and separate, one by one; he tells us, that then he set upon writing these Speculations. In which he gives us in the first place his *Natural History of Musick*, which being the ground of the whole work, we think it will not be unacceptable to the Reader, to find it here entirely *Englisht*; especially since the Book it self is yet very scarce in *England*, the commerce between our and the Italian Stationers being very slow, if there be any at all. But before I here deliver this History, I find my self obliged to take notice, that it, as well as divers other parts of this Treatise, are somewhat obscurely written; which the Reader of the Book it self, though he be well versed both in the Language wherein 'tis written, and in the Argument, will find to be so, whenever he shall have opportunity and leisure to read it: This being premised, the History it self follows.

The Natural History of Musick.

A Sound begins from the collision of two parts of the Air, which parting from one another, make a vacuity as to Air, in which *vacuum* two other parcels of Air do meet and knock one another: And because the two first parcels of Air do incline to return to the center of the collision, but cannot, because the room is taken up, they do part from the center by lines curled and as 'twere recurring to their first place, in the doing of which they make a collision with those parts of the Air that have possessed themselves of *their* room. And thus the *species* of the Sound is multiplied and extended.

These curled lines are more waving *near* the center of the collision, as being more stretch't long-ways than spirally, and less waving when they are further off from the center; in which latter lines, the inclination to return towards the center is prevalent above the impetus of receding from it; so that at last they turn back towards the center. Thus of the *species* of a Sound there is filled a sphere of Air, or such a part of a sphere of it, as this motion of the Air can without impediment spread it self through.

In like manner *two* Sounds, from *two* centers, one within the sonorous sphere of the other, do begin and are distributed through the small particles of the Air, in such a manner, *that* some of the pulses are affected by one sound, and others, without confusion, by the other, and *that* the pulses of the acuter sound are swifter and do compleat their curlings in a shorter time, and the pulses of the graver sound in a longer.

The *Aura* or subtile matter, in which these motions of the Air are made, according to its incomparable sublety, and that property which it hath of being altogether indifferent to any condition of bodies, and suited exactly to represent any motion, or stamp, or weight of other bodies, among which 'tis found; this *Aura*, I say, doth second, and not at all impede the two motions produced by those two sorts of pulses, being moved with all the innumerable intermediate motions. There may also more sounds than two be distributed through the particles of Air, yet not without some confusion. And the more Sounds there are, the more confused will the distribution of the pulses be, especially near the centers themselves, whence the Sounds begin.

The *Ear* is an Organ, by which a man placed in a sonorous Sphere perceives sound, consonancy, and songs. This organ hath three parts; the *exterior*, which is without the Cavity of the Ear, and visibly extant on the head; the *middle-most*, which is the Cavity it self; and the *innermost*, which being within the Cavity, is a stony bone of the form of a sponge, in which is a cavern, recurring to the hollow part of the Ear, and shaped like a knot of ribonds (*ital. nastro:*) And in all the holes of this spungy-like bone there are found webs stretch't out, that enclose the Air congenit or implanted.

The *Middle* part is closed up by *two* membranes, called *Drums*, stretcht over the cavity of the Ear. And of these two, the one is *external*, at the bottom of the exterior part of the Ear; and the other *internal*, upon the mouth of the cavern. And between these Drums there are three small bones, tied to one another, and to the drums, and fastned in two points to the sides of the cavity, and movable, so that if the outward Drum does shake, the inward must shake also, and that twice as often.

The

The inclination of these two Drums is to move in a proportion to the double*; but the exigency of the instrument makes them move differently from their inclination : So that this is the sensitive Organ, in which the Soul is to take notice of what is there acted.

* (Ital. *In proportione dimidiata della doppia.*)

Between the two drums there is no *Air* properly so called,* but only an *Aura*, which seconding the inclinations of the drums to motion, and the motions themselves, preserves all the intermediate inclinations and motions. And the reasonable Soul, permanent in its nature, placed in the fitting Body as the Form thereof, hath this natural property, to make what is temporal permanent, that is to say, to stay Time in her self, and to collect all the times of the intermediate inclinations and motions, which are in the *Aura*; in the doing of which, she abstracts from matter two things that are demonstrated to be proportional, as the logarithmes, of the two *Ration's*; one of the drums Inclinations to motion, and the other of the drums motions themselves. Whence the Soul in hearing hath alwayes ready the two *Ration's*, double in act, and half of the double in *inclination; of which she makes use for measures to apprehend all the rations of Sounds.

* Though the Author will admit of no Air commonly so called between the Drums; yet he admits of such Air in the Cavern, and within the *os Petri sum*, the inward part of the Ear; because the Drums would have no motion at all, if there were nothing but *Aura*, for as much as this *aura*, though it may be mov'd by any other thing, yet it cannot be a means to convey motion from one body to another. It is, *saith he*, the internal instrument of the Mover, that lodges there *within*, but not of any Mover that is *without*. See page 15.

*(*Doppia in atto, & dimidiata della doppia,*)

If the Ear be within a Sonorous Sphere, the particles of the Air affected by the sound do enter at the external part of the Ear, one after the other, and all pass in order, through the spiral wayes that are there, to the bottom of the Ear, where every one strikes the drum, and after that, by other spiral wayes, issue out of the Ear again, and so give place to other particles of air, that succeed to do the same.

The external drum being struck once, shakes frequently; and, by means of the three little bones, the internal drum answers to it in a double frequency; and the *aura*, in the cavern

of the cavern of the internal part of the Ear, alternately goes and comes through its knot-like passage, and spreads it self through the other wayes of the spongy-like bone, and being repercussed to the webs that close it, rebounds and multiplies the sound. An other parcel of Air follows, and strikes the drum again, and causeth the shaking as before.

But if the Ear be within two Sonorous Spheres, the affected pulses that cause the sound, do succeed the one amidst the other, by turns, to strike the outward drum; and by the exigences of the alternations, the *ration's* that are not expressible by numbers become to be so, and that *both* of such numbers, as can be distributed amongst the particles of the Air, and of such alternations, as that amongst the strokes, the shakings of the drum may be all numbred. And the soul perceives the numbers of these alternations, and the numbers of the shakings of the drum amidst the strokes of the two sounds: And whilst the *aura* that is affected by the two sounding bodies, does communicate with the *aura* between the drums, she there takes also notice of the Logarithme of the *ration* of sounds, and commensurates it with the Logarithmes of the *ration's*, the double, and its half.

Now, for as much as the Soul pleaseth her self with two sounds together, and with the succession of many sounds one after an other, that occur in one Song, 'tis necessary she should comprehend in the *sense* these three things which she perceives, without any abstraction of the *Mind*. The numbers of the alternation must needs be easy to make, and two in one sole numeration. The commensuration of the Logarithmes must be made by the way of an easy division into parts, and into a number of parts easy to be numbred.

And because it is not possible precisely to accord these two things equally, some errors must needs happen, which may be all perceived by *Reason*, but cannot all be alike taken notice of, by *Sense*: Some are insensible, some altogether intolerable and absurd, others between both; and of these, some are nearer to the insensible ones; others, to those that are intolerable: Of which errors, convenient estimates are given, and according to the differences of those errors the *ration's* of sounds are distinguish't.

Lastly,

Lastly, because it is not possible equally to adjust these two things with the numbers of the shakings of the drum; 'tis necessary, that the soul, desirous of the delight, in the earnest attention to the sound do invigorate her self, and be busy and intent about the outward drum, drawing and restoring it from time to time, more or less; that so the numbers of its shakings may answer to the alternations of the touches, and to the logarithms of the most easy numbers and parts that's possible: In the doing of which, she learns the Tune which she hears, and keeps it within her, and is glad to find herself moved by various affections, sometimes to stretch the drum, sometimes to relax it, otherwhile to leave it in its natural tension, with a certain order, and for certain cases of the sound, which in the Tune do occur to her.

So far his History of Musick; which being premised by him, he gives us a very particular and minute Description of the *Ear*, of *Sound*, and of *Hearing*, especially of the Hearing of two sounds together; where occur many *Theorems*, by him laid down as the chief Foundation of his whole work. Which done, he treats of all sorts of *Musical Intervals*, their perfection and Measure; explicating this doctrine also by many *Theorems*, and giving withal the Definitions of the several Intervals, and taking particular notice of six sorts of them, for which having found no names, he thought fit to borrow names for them from *Colors*.

Next, he discourses at large of the *True Numbers* of Sounds, and of the various properties thence resulting for Musical Intervals; all which he likewise elucidates with divers considerable Theorems; shewing withal, between what true numbers of Sounds the *Species* of each Interval is most perfect; and teaching, that the rational Soul by her active and earnest attention gives the *true number* to the *first Sound*, that in the Ear is exhibited to her.

Further, he treats of Musical *Chords*; then of *Singing*, and the *Modulation* or *Tune*; which latter he distinguishes from Singing in general, by this, That it is such a kind of Song, as impresses it so strongly upon the Soul, as to incline her to sing it over and over again. Here, by the help of a *Table*, he shews to have compos'd in order all the *Species* of possible Modulations or
Tunes

Tunes in every Tetrachord, and reduced them also to a Table.

Besides this, he discourses amply of the *Accord of more* pag. 190. *Sounds*, and of *Harmonical Proportionality*; as also of the *Passions* of the Soul; how they are concern'd in and wrought upon by Musick, giving us a *Table* of the several Musical Cherdes suited to the several Affections. He concludes the whole with a large discourse of the Modern, both Church and other, Musick,

Now, whether this Author have by all these his Speculations and pains given a perfect *Scale of Musick* according to the true Proportions of Sounds, (which is the great *desideratum* in Musick,) we must leave to the judgement of the great Masters of Musick, especially to the judicious and extraordinarily skilful Musitian Mr. *John Birchenhu*; who, it is still hoped, if he be competently encourag'd and assisted, will in due time publish to the world a Compleat System of Musick, after the method formerly taken notice of in these *Traçts*, Numb. 90. p. 5153.

II. *Georgii Wedelii M. D. Specimen Experimenti Novi, de Sale Volatili Plantarum, Francofurti, 1672, in 12°.*

THis Author endeavors to shew in this *Traçt*, that by a peculiar way there may be drawn out of Plants a true and genuine *Volatil Salt*; asserting, that there is not only in Cephalick, Anti-scorbutick, &c. but also in those Plants that are insipid and accounted cold, a volatil Salt lurking. And this he offers to prove;

First, by the food of Animals, that live altogether upon Grats, and such like herbs, and do abound in Volatil Salt; which he pretends is not made such by digestion, since to him it is not imaginable, that the Heat of Animals, or the Ferment of their innate Volatil Salt, is so multiplicative, as to diffuse and extend it self so far, as to prepare this Salt, and that so copiously out of Herbs supposed to have none such.

Secondly, Chymists are granted to draw hot Spirits out of cold: Why then should they not afford Volatil Salts, since ardent Spirits are akin to them?

Thirdly, the smoak and foot of herbs and wood punge the eye: Whence that but from a volatile Spirit?

Fourthly,

Fourthly, Wine abounds in Volatil Salt, and out of its *feces* such Salt is extracted.

Fifthly, Bread as soon as 'tis in the stomach, refreshes and recovers the faint, before any Chyle or blood is made of it; and even the steam of bread in the Oven is restorative. Whence else, but that the Volatil Salts, which are subtiler and exceeding active and piercing, are darted into the Nerves, Veins and Arteries, and thereby suddenly relieve the indigent body?

Sixthly, he affirms to have obtained fine crystals out of *Quinces, Opium, &c.* which he can deduce from no other principle than that of Volatil Salt.

Seventhly, he saith, that he hath *actually* drawn from a certain herb a very fine Volatile Armoniacal Salt, without any additament that could be as much as suspected to participate in the least of any such Salt; and that he hath performed this without fire.

This done, he relates the several ways used by others to draw Volatil Salt out of Plants; and on this occasion distinguishes two sorts of *Fermentation*, the one *destructive*, whereby the Form of the mixed bodies perishes, and which tends to Corruption; the other *Elicitive*, whereby parts latent are brought to light, and are extricated from the bonds that kept them imprisoned. And by this latter way he saith that the Volatil saline parts may be set at liberty and made to fly away.

And having declared, that by means of an Artificial fermentation Volatil Salt may be obtained out of Plants, more or less; he giveth this general direction about it, that they must be bruised, digested, and in due time (which is chiefly in the Spring) their Volatil Salt collected; referring particulars to a time, when he shall have verified this Experiment in more Plants, than he hath yet done.

To all this, he annexes the great Use of Volatil Salts extracted out of Plants, especially in almost all Diseases, for as much as they are able to dis-obstruct the pores of the Brain; disperse Lethargies and Apoplexies; afford to the Spirits a free passage through the nerves; recover faintings; remove hypochondriacal and hysterical suffocations; attenuate the blood; pass into the inmost recesses of the bowels, and open all obstructions there; depurate the blood, and what not?

He concludes the whole with four Chapters, whereof the *first* treats of the Pores and Figures of Volatil Salts, corresponding to those of the Brain, Heart, Blood, Nerves: The *second* compares Volatil Salt with Quicksilver, which he takes to be nothing else but a Volatil Salt: The *third* examines, whether Volatil Salts are contained in Mixts *actually* or *potentially*: The *fourth* inquireth, whether all Volatil Salts are of the same kind.

So much of this Author; whose way not being here made out and declared, we hope, a Learned and very knowing Member of the *R. Society*, Doctor *Daniel Caxe*, will shortly supply the world with that defect, he being certainly and experimentally master of a sure and easy way of extracting the Volatil Salt out of all sorts of Plants.

An Advertisement.

HEaring of great complaints of the *Rot* of Sheep in many parts of *England*; we thought, it would not be unwelcome to the Reader, to be, on such an occasion, directed, for a good and cheap way of preventing the disease, to what the Honourable *Robert Boyle* hath published in his second *Tome* of the *Usefulness of Natural Philosophy*, printed at *Oxford A. 1671. p. 15.* The short whereof is; That a great Sheepmaster lately preserv'd his Flocks in a moist Country, when most of his neighbours lost theirs; and that he did it by the bare use of (*Spanish*) Salt, of which each Sheep, being first made to bleed a little under the Eye, was made to take down a small handful, two or three times (with some days of interval,) without being suffer'd for some hours to drink any thing after it.

L O N D O N,
Printed for *John Martyn*, Printer to the *Royal Society*. 1674.